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Active vibration control using piezoelectric actuator: Implementation of ant colony optimization technique in virtual experimentation (Article)

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Abstract

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This paper demonstrates the implementation of virtual experiment using COMSOL Mutiphysics – MATLAB integration for optimization in active vibration control system. The benchmark model is a simply supported thin plate excited and attenuated by two piezoelectric patches. Instead of using equation-based modeling to represent the system, optimization of the sensor-actuator location and controller gains are conducted directly on the finite element model in COMSOL Multiphysics via Livelink for MATLAB function. The optimization is based on the average energy reduction across a frequency range between 11 Hz to 50 Hz, which covers the first three modes. It is found that the maximum attenuation achieved is 68.31% using optimal values of sensoractuator location and controller gains. © 2014, UK Simulation Society. All rights reserved.

Author keywords

Active vibration control   Ant colony optimization   COMSOL multiphysics   Livelink for MATLAB   MATLAB integration

Indexed keywords

Engineering controlled terms:	Actuators Algorithms Ant colony optimization Artificial intelligence Controllers Finite element method Piezoelectricity Vibration control Virtual reality
Compendex keywords	Active vibration control systems Active vibration controls Comsol multiphysics Equation-based modeling Piezoelectric patch Sensor actuators Virtual experimentations Virtual experiments
Engineering main heading:	Piezoelectric actuators

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